

Show ALL of your work for full credit. Simplify your answers as much as possible. Each problem is worth 6 points unless otherwise specified.

Given quadratic equation $x^2 - 8x - 4 = 0$, solve using

1. completing the square

$$x^2 - 8x + 16 - 20 = 0$$

$$(x-4)^2 - 20 = 0$$

$$(x-4)^2 = 20$$

$$x-4 = \pm 2\sqrt{5}$$

$$x = 4 \pm 2\sqrt{5}$$

2. quadratic formula

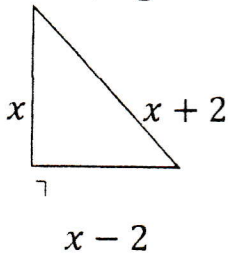
$$x = \frac{8 \pm \sqrt{64 + 16}}{2}$$

$$= \frac{8 \pm \sqrt{80}}{2}$$

$$= \frac{8 \pm 4\sqrt{5}}{2}$$

$$= 4 \pm 2\sqrt{5}$$

3. Given, right triangle, find the lengths of the sides.



$$x^2 + (x-2)^2 = (x+2)^2$$

$$x^2 + x^2 - 4x + 4 = x^2 + 4x + 4$$

$$x^2 - 8x = 0$$

$$x(x-8) = 0$$

$$x=0, x=8$$

since $x > 0$

sides:

$$\underline{6, 8, 10}$$

Solve each equation and verify your answer.

4. $3x^3 - 9x = 0$

$$3x(x^2 - 3) = 0$$

$$3x(x - \sqrt{3})(x + \sqrt{3}) = 0$$

$$x = 0, x = \sqrt{3}, x = -\sqrt{3}$$

5. $\sqrt{2x+29} + 3 = x$

$$2x+29 = (x-3)^2$$

$$2x+29 = x^2 - 6x + 9$$

$$x^2 - 8x - 20 = 0$$

$$(x-10)(x+2) = 0$$

$$x = 10$$

$$x = -2 \text{ (delete)}$$

since $\sqrt{25} = -2-3$ not a solution
x

6. $x^{3/2} = 125$

$x^{3/2} = 5^3$ $x^{1/2} = 5$ $x = 25$

Solve each inequalities and write your answers using interval notation.

7. $3|4 - x| - 2 < 16$

$|4 - x| < 6$

$-6 < 4 - x < 6$

$-6 < x - 4 < 6$

$-2 < x < 10$

8. $5 < \frac{-9x+3}{3} \leq 7$

$15 < -9x+3 \leq 21$

$12 < -9x \leq 18$

$-2 \leq x < -\frac{4}{3}$

The endpoints of the diameter of a circle are (1, 2) and (3, 4). Find the

9. center

$(2, 3)$

$(\frac{1+3}{2}, \frac{2+4}{2})$

10. radius and

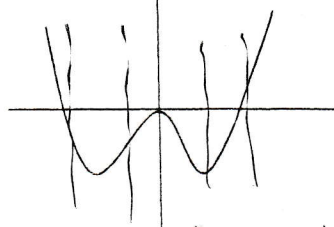
$\sqrt{(2-1)^2 + (3-2)^2} = \sqrt{2}$

11. Write the equation of the circle in standard form, no need to simplify

$(x-2)^2 + (y-3)^2 = 2$

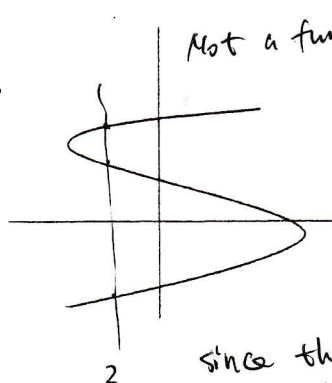
12. Determine if the relation defines y as a function of x. Explain your reasoning. [2points each]

a. yes. A function



since there is no vertical line that intercepts with the graph more than once

b.



since there is at least a vertical line that passes the graph more than once.

13. Find the domain of the following equations. Write the answer in interval notation.

$$h(x) = \sqrt{\frac{x+2}{3}} \quad \frac{x+2}{3} \geq 0 \quad \Rightarrow \quad \begin{aligned} x+2 &\geq 0 \\ x &\geq -2 \end{aligned}$$

$[-2, \infty)$

14. Given $f(x) = x^2 + 3x$, find $f(x+2)$.

$$\begin{aligned} f(x+2) &= (x+2)^2 + 3(x+2) \\ &= x^2 + 4x + 4 + 3x + 6 \\ &= x^2 + 7x + 10 \end{aligned}$$

15. Express the $2x - 3y = 6$ in slope-intercept form and

$$\begin{aligned} 2x - 6 &= 3y \\ y &= \frac{2}{3}x - 2 \end{aligned}$$

16. Identify the slope and y-intercept

$$\begin{aligned} m &= \frac{2}{3} \\ y\text{-int} &: (0, -2) \end{aligned}$$

17. Given $f(x) = 2x^2 + 2$, determine the average rate of change from $x_1 = 1$ to $x_2 = 3$.

$$\begin{aligned} f(x_1) &= 4 \\ f(x_2) &= 20 \end{aligned}$$

$$\text{average rate of change} = \frac{20 - 4}{3 - 1} = 8$$